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## THE INTEGRATION OF ZERO-BASE BUDGETING WITH MANAGEMENT-BY-OBJECTIVES: AN EMPIRICAL INQUIRY\*

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### Abstract

Popular arguments in the management literature advocate the implementation congruity and complementarity of zero-base budgeting (ZBB) with an established management-by-objectives (MBO) system. The present study examined management perceptions on 28 ZBB implementation variables for MBO users and non-MBO users which were gathered from 153 managers at two hierarchical levels within a single private sector organization. Results from both univariate and multivariate tests indicate that ZBB implementation was not facilitated by the existence of an MBO system for either lower level management or for upper level management. The evidence obtained here strongly suggests that the purported conventional rationale underlying ZBB coupling with an extant MBO system is seriously defective; ZBB design implementation issues need to be thoroughly re-assessed, with the emphasis on matching compatible systemic properties between information sub-systems.

Zero-base Budgeting (ZBB) has been heralded as one of the most promising techniques for controlling discretionary cost activity in hostile environments.<sup>1</sup> Practical implementation, however, has often been marred by controversy. Various explanations are offered for the difficulty in implementation, including lack of organizational support (Van Gunsteren, 1976); lack of appropriate training mechanisms (Schick, 1978; Dean & Cowen, 1979; Cowen & Dean, 1979);

administrative complexities (Anthony, 1977; Gurvitz, 1977; Draper & Pitsvada, 1978); incompatible coupling with cognitive abilities (Wildavsky, 1975); and symbolic political strategies (Dirsmith & Jablonsky, 1979a; Dirsmith *et al.*, 1980) in tandem with ritualistic budgeting processes (Jonsson, 1982).<sup>2</sup> These cited difficulties converge to suggest that adoption of ZBB creates additional information processing requirements for the organization.

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<sup>1</sup> The use of the term "hostile" environments in conjunction with ZBB is generally intended to signify the need to reduce or eliminate slack resources in the organization. Of course, ZBB may be deployed for resource re-allocation purposes which subsequently leads to increased discretionary spending, notwithstanding environmental uncertainty.

<sup>2</sup> Ginzberg (1980) provides a summary of the implementation factor research and implementation process research literature related to the implementation of accounting and information systems. Also, Galbraith (1973) provides an excellent "rational" view of strategies intended to match organizations' information processing needs and their information processing requirements. For a "political" view of this process, see Markus & Pfeffer (1983) and Pfeffer (1978).

One possible solution to this information imbalance problem in implementing ZBB is two-sided: generate strategies, on the one hand, to reduce the information requirements of ZBB; alternatively, generate strategies to increase the organizational capacity for ZBB integration.<sup>3</sup> Elements of the former include, for example, an expanded temporal frame for ZBB implementation, increased budgeting personnel, and budgetary incentives, while the latter is effected by formalization procedures such as standard operating decisions, common communication formats and language, and management training programs. Recently, a strategy has been promulgated which embraces both aspects of this solution. It focuses on the supposedly complementary nature of ZBB and Management-by-Objectives (MBO) (Dady, 1979; Keys & Bell, 1979; Bhada & Minmier, 1980; Migliore, 1980). Stated simply, the existence of a solidly entrenched, mature MBO system is viewed as an ideal precondition for implementation of ZBB. Smooth co-alignment of ZBB with MBO is viewed as self-evident.

The strategy has an obvious appeal to budgeting system designers and managers: both ZBB and MBO processes reflect a planning and control orientation; both transcend the organization hierarchy; both require goal specification and clarity; means-ends linkages are deemed to be mutually unambiguous; and rational calculation is the preferred mode of both processes (Drucker, 1954; De Woolfson, 1975; Jun, 1976; Phyr, 1973; Haider, 1977; Patillo, 1977; Knight, 1979; Dirsmith *et al.*, 1980). The complementary matching arises from the nature of the resource allocation process; MBO stresses desired outputs while ZBB emphasizes required inputs. There is, however, no rigorous empirical evidence on which to assess whether ZBB can be implemented more readily in systems which employ MBO.

The present study was triggered when one of the largest natural resource companies in Canada implemented ZBB as part of its operational planning process. The setting provided an

opportunity to assess the integration of ZBB with MBO, as the organization had previously adopted the latter system on a voluntary basis, such that, at the time of ZBB implementation managers were almost evenly divided between MBO users and non-users. The focus on a private sector organization, moreover, encouraged viable design metastrategies (Hedberg *et al.*, 1976), such as the coupling of a management system (MBO) with a specialized and complex budgeting system (ZBB), to dominate over issues of political rationality (Wildavsky, 1975; Dirsmith & Jablonsky, 1979b) which permeate the ZBB environment of public and not-for-profit organizations.

At least three reasons for pursuing an inquiry into ZBB implementation within an existing MBO framework are apparent. First, and from a more general perspective, recent articles on budgeting system design have discussed the need for designers' anticipation of system implementation consequences (Hopwood, 1978; Boland, 1979); knowledge pertaining to predesign criteria for effective systems implementation and integration (Ansari, 1977); and the need to anticipate the incompatible coupling of cybernetic and/or non-cybernetic control models (Landau & Stout, 1979; Hofstede, 1981). Second, virtually all of the surveys and case studies on ZBB implementation have lacked a reasonable experimental and/or control group for testing purposes or have been devoid of any substantive hypotheses. Finally, and somewhat ironically, a substantial portion of the controversial literature on ZBB has emanated from public sector agencies where the emergence of MBO pre-dated that of ZBB (Dirsmith & Jablonsky, 1979a; Haider, 1977; Rose, 1977; Drucker, 1976), yet the strategy under inquiry presupposes that the same sequence of systems implementation is advantageous in a private sector setting.

The remainder of the paper is organized into seven main sections. The first describes a framework which results in a set of hypotheses. The methodology section then presents and dis-

<sup>3</sup> For examples and further discussion, see Gordon *et al.*, 1984.

cusses the sample, the ZBB variables of primary interest in the present study, and the research design. Next, the results of the study are presented, followed by discussion and implications of the results. The final sections contain a statement of study limitations and brief concluding comments.

## FRAMEWORK FOR HYPOTHESES

The issue of concern in the present paper is the attitudinal and behavioral perceptions surrounding implementation of ZBB where there is an extant, well-developed MBO system as opposed to implementation in the absence of such a system. Arguments from the professional literature which suggest that MBO would facilitate the implementation of a ZBB system are couched in three factors: (1) the goal-setting process; (2) the technological and methodological match between each process; and (3) a learning dimension reflective of the first two factors, considered either separately or jointly. It should be noted in the present context that this set of factors deals exclusively with the process of budget preparation and planning; this set is in the *ex ante* control mode, and hence, does not include the *ex post* evaluative mode as part of the implementation process of ZBB. This is consistent with Hopwood (1976), Amey (1979a; 1979b) and Flamholtz (1983) who view budgets for planning and for control as logically separate systems. Thus, the analysis of implementation strategies should not logically co-mingle the two modes of control.

Apart from the above perspective, the reader should remember that the present inquiry is exploratory, and consequently, it is not guided by a well-developed theory. Rather, the hypotheses listed below are derived from the professional management literature which follows the doctrine that the existence of any rational system (e.g. MBO) facilitates the coupling or implementation of a new rational system (e.g. ZBB). However, it is possible to marshal argu-

ments which challenge this doctrine in the present context, and these are presented following the derivation of the research hypotheses.

### *Goal-setting*

MBO systems stress goal-setting and are results-oriented. Empirical studies note that MBO leads to increased clarity in goal structures (Shetty & Carlisle, 1974; Tosi & Carroll, 1973), increased goal specificity (Raia, 1965), and increased goal awareness (Raia, 1965; Shetty & Carlisle, 1974). The goal-setting process is complex, and intervening or moderating variables such as quality of participation, defensive communication, leadership styles, motivation, and organizational structures "hold the power to make or break an MBO application" (McConkie, 1979, p.468). Presumably though, a mature, stabilized MBO system has harnessed the positive effects of appropriate moderating variables. Moreover, the theoretical framework of ZBB mirrors the same set of goal-setting factors as MBO. Therefore, the co-alignment of ZBB with MBO entails duplication and overlap of the goal-setting process.

The argument from the professional literature is that previous MBO users should have in place a firm understanding of their roles and objectives. Moreover, this understanding should be easily transferred and integrated into the ZBB framework. The process of readdressing the substantive aspects of the goal-setting process in conjunction with ZBB implementation would, therefore, be of less benefit to previous MBO users than to non-MBO users. It is further argued that there is a greater need and, as such, a greater contribution to non-MBO users in terms of improving communications, understanding, and agreement on goals and objectives between superiors and subordinates than would occur for MBO users. Stated as a research hypothesis:

*H<sub>1</sub>*: The goal-setting process associated with ZBB implementation yields a lower level of perceived benefit for previous MBO users than for non-MBO users.

### *Resource allocation process<sup>4</sup>*

For MBO, the resource allocation process is

<sup>4</sup> The use of the phrase "resource allocation process" is used in place of the more familiar, but synonymous phrase, "planning and budgeting process."

interactive, incremental and, some would argue, often non-financial (unless MBO is a component part of operational planning). It is interactive in that a process of mutual goal-setting cascades down the organization hierarchy to the lowest contributing sub-unit and manager. Standards, in the form of mutually expected end-results, are an integral part of this process (Carroll & Tosi, 1973; Drucker, 1976; McKonkie, 1979). The process is, simultaneously, implicitly incremental; there is no overt accompaniment of designated funding to match the desired output goals of the manager, sub-unit, or organization. There is, however, an implicit understanding that continuity of programs will prevail, supplemented where necessary by a proportionate increase relative to the previous financial base. ZBB, in contrast, has interactive processes which originate at the lowest management level, with a focus on inputs, and terminate at the upper level of the management hierarchy in a non-incremental manner, with no necessary guarantee of program continuity (Phyrr, 1970, 1973; Cheek, 1977; Knight, 1979; Williams, 1981). On the surface, MBO is a highly rational resource allocation process, which can be characterized by the following sequence: objectives → funding → strategies<sup>5</sup>; whereas, the sequence for ZBB is: strategies → objectives → funding.

Arguments for the complementarity of ZBB and MBO directly or indirectly focus on the above sequencing mismatch (Keys & Bell, 1979; Knight, 1979; Bhada & Minmier, 1980). According to Bhada & Minmier (1980, p.45) the MBO process does not "... provide for methods of achieving results. It is precisely this limitation that ZBB attempts to eliminate, for it formalizes an expression of 'how' ends are to be achieved". The subtle issue though, apart from the recognition of the complementary nature of ZBB relative to an MBO system, is the professional literature's view that ZBB implementation would be facilitated by the existence of an established MBO system. For example, Bhada & Minmier (1980, p.45) note that "... the MBO process

should help to articulate *sectional strategies* ... at each organizational level" (emphasis added). Moreover, Keys & Bell (1979, p.31) argue that ZBB and MBO "are not only compatible ..." but that an established MBO system "... helps managers understand the complexities involved in relating goals to budgets". Migliore (1980, p.14) asserts that "ZBB ... would adapt well to MBO" again because both are rational processes and MBO users have been indoctrinated into the strategy formulation process by virtue of their background. The implication of these arguments is that MBO users would perceive more benefits than non-MBO users, not because of ZBB *per se*, but rather because ZBB constitutes a natural extension and enhancement of the resource allocation tasks with which MBO users are familiar and already performing. Thus, the following research hypothesis ensues:

*H<sub>2</sub>: The resource allocation process associated with ZBB implementation yields a higher level of perceived benefit for previous MBO users than for non-MBO users.*

### *Learning*

It is generally recognized that the introduction *and* implementation of any new information system, such as ZBB, is subject to a learning curve phenomenon. There is virtually no disagreement in the ZBB literature that any implementation of ZBB would contravene this phenomenon. However, there is an implicit conviction in the professional literature proposal to couple ZBB specifically with a mature MBO system that the effort required to learn and implement ZBB would be facilitated on a relative basis by previous exposure to the MBO system.

Presumably, the MBO system would foster an individual's predisposition towards more planning (Ivancevich, 1969; Ivancevich *et al.*, 1970); acclimatize an individual to a structured planning process; invoke a clearer understanding of roles and objectives (Raia, 1965; White, 1974); enhance superior-subordinate communication capabilities (Raia, 1965; Rossano, 1965); and favorably facilitate an awareness of resource

<sup>5</sup> The use of the word strategies in the present context is intended to mean the specific delineation of "ways" to achieve short-run objectives.

allocation (Tosi & Carroll, 1968). Clearly, the efficient extension of these attributes to a ZBB system is quite tenable according to the coupling proposal. In the absence of MBO, even where there is a traditional budgeting system in place (as in the present instance), the implication is that the time required to learn ZBB would be greater. Managers would be compelled to adapt to structured planning in order to satisfy the constraints of ZBB. They would have to initiate the goal-setting process, including the identification, expression, agreement and documentation of their roles, responsibility, and objectives, without benefit of the MBO experience. Concomitantly, even though MBO is an incremental process, the absence of MBO would not particularly favor the non-incremental resource allocation process imposed on managers by the ZBB model in terms of learning effort. Thus, formulated as a research hypothesis:

*H<sub>3</sub>*: The learning effort (i.e. time) associated with ZBB implementation is lower for previous MBO users than for non-MBO users.

Contrary to the above views, however, it is plausible that ZBB's emphasis on goals will be seen by MBO users as useful *precisely because* it is seen as building upon the MBO goal structures. MBO users have gone through the trauma of erecting goals, so they will see ZBB as building upon them, thus reinforcing and justifying the effort previously invested. Non-MBO users, on the other hand, will experience ZBB as a trauma of erecting goals without having done so with MBO. These people will see ZBB *in its early stages* as a disturbing influence. Also, given the voluntary nature of the MBO system, any questions of the utility of goal-setting (even though directed at ZBB) will be interpreted, wittingly or not, as an evaluation of goal-setting *per se*.

Although MBO users may very well like the goal setting part of ZBB because it *utilizes* (indeed, is hardly different from) the MBO product (i.e. the goals), the situation may not be similar for the resource allocation process. The hypothesis here has to do with whether MBO users will like, and therefore easily adapt to, a *different* resource allocation process even

though it may be complementary. Here the question is one of possible cognitive overload. Would MBO users regard ZBB as overly disruptive as compared to a system which they have recently managed to adopt and understand? Moreover, this type of disruption suggests that the learning research hypothesis is not reasonable because ZBB coupled with MBO adds to complexity and the risk of cognitive overload. These counter-arguments to the professional literature notwithstanding, the research strategy followed in the present paper is to test the research hypotheses as stated.

## METHODOLOGY

### *Organization setting and sample*

The organization in this study is a wholly-owned subsidiary of a very large multi-national conglomerate which has a long history in the energy field. The Chief Executive Officer (CEO) was responsible for operations dealing with oil and gas exploration, petroleum and mineral production, and heavy oil extraction projects located in Canada. The operations comprised a total work force of about ten thousand employees. The operating budget volume was over one billion dollars at the time of ZBB implementation.

The organization involved was committed to a rigorous MBO program. The commitment was evidenced by a formal statement of policy in the organization manual distributed to employees. The rigor was evidenced by the existence of internal MBO training programs, sophisticated communication forms, dated scheduling for identifying and planning objectives, and a formal exception routine for monitoring feedback and controlling achievements. The program closely paralleled McConkie's (1979a, p.37) definition:

MBO can properly be defined as: A managerial process whereby organizational purposes are diagnosed and met by joining superior and subordinates in the pursuit of mutually agreed upon goals and objectives which are specific, measurable, time bounded, and joined to an action plan; progress and goal attainment are measured and monitored in appraisal sessions which centre on

mutually determined objective standards of performance.<sup>6</sup>

The MBO system had been adopted some six years earlier on a voluntary basis. The company's initial motivation for establishing an MBO system was to bridge communication channels between expanding quasi-autonomous production and exploration units and a traditional incremental budgeting system at the operating level. Managers at lower levels (i.e. levels four and five) had been encouraged, but not pressured, to adopt MBO.<sup>7</sup> At the time of adoption of ZBB, which was mandated for all managers throughout the entire organization, approximately one-half of lower level managers in the organization were using MBO and one-half were not. Nearly 60% of the MBO users had participated in the MBO system since its inception and approximately 85% had participated for three years or longer. Of the non-MBO users, less than 10% had participated in the MBO system at one time or another, and none for longer than one financial operating cycle (i.e. one year). After six years of use, the retention of MBO was definitely not in question because it was perceived that, for those who used it, the process was yielding positive results.

The MBO system spanned the entire lateral dimension of the organizational structure, which can be classified into six departments for the present discussion. Four out of the six departments were major operating segments of the organization. The fifth department was responsible for research and technological development, while the sixth department was comprised of all the remaining service support functions, including finance, accounting, human resources, external affairs, general services, law, tax, and others. However, the voluntary nature

of the MBO system and its corresponding membership were most clearly distinguished in terms of the organization's vertical hierarchy. The CEO at level one, together with executives at levels two and three (i.e. upper management) were necessarily involved with both MBO and non-MBO users on a continuing basis because of their commensurate authority and responsibility. Thus, the use of MBO was not optional for these managers, but the option did exist for line managers at levels four and five (i.e. lower management). Users and non-users of MBO were more or less uniformly dispersed across all six departments.

A softening of the international oil market in 1981, combined with the emergence of a Canadian National Energy Program and perceived unfavorable provincial pricing agreements, triggered top management's attention to operating costs in an effort to remain profitable. ZBB was seen as a necessary system for the entire organization under these circumstances, and was mandated for all managers at all levels. ZBB was pilot-tested in the same year and a decision for full-scale implementation ensued the next year.

Management responses relating to the three research hypotheses were elicited by two different questionnaires: one was distributed to decision unit managers (according to the ZBB terminology) classified as upper management, while the other questionnaire was distributed to decision unit managers classified as lower management. The justification for this research design requires further explanation. On the one hand, the detailed theoretical treatment of the ZBB methodology (Phyrr, 1973; Cheek, 1977; Knight, 1979) explicitly recognizes that the decision making complexity and the related ZBB process tasks are logically different for upper

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<sup>6</sup> Note that the Bhada and Minnier (1980) quotation cited earlier and the McConkie (1979) quotation disagree as to whether MBO provides for means of achieving results. We see this as a semantic difference, since MBO does include an action plan, but not necessarily in specific detail.

<sup>7</sup> The voluntary nature of the MBO program was a troublesome issue to the present researchers and an anonymous reviewer in terms of its legitimacy and potential power implications. Top management steadfastly defended its position that these factors were not an issue. They pointed to the organization's incentive schemes, the performance-reward mechanisms in the various departments throughout all levels of the hierarchy, and especially to the unbiased promotion record across both MBO users and non-MBO users over the last six years.

level decision unit managers than for lower level decision unit managers. Among the more obvious differences are the cross-impact analysis function and the *de facto* funding decision required of top management. These differences were confirmed in the organization under study, particularly with respect to the funding decisions, which were determined collectively by upper management. On the other hand, the arguments put forth in the professional literature on the compatibility of ZBB and MBO do not address these differences in the context of ZBB implementation other than in the vaguest of terms. Rather, the assumption is that the degree of ZBB compatibility with MBO at different hierarchical levels is uniform, and therefore is not an issue. Thus, the utilization of two different questionnaires is an attempt to assess any differences in this respect.

Accordingly, the first questionnaire was administered to decision unit managers at the fourth and fifth levels (lower management) of the organization hierarchy *prior* to the final funding decision made by upper management. The reason for this timing was to avoid potential distortions of responses in the lower management groups emanating from the ultimate level of funding obtained. Incomplete identification of user status, no responses, and exclusion of pilot-tested respondents, produced a sample of 121 usable questionnaires from a total of 151 questionnaires. The second questionnaire was administered to decision unit managers at the upper management level immediately *after* the final funding decision but before any monitoring of *ex post* operating strategies. Since one of the primary tasks of upper management is to make the funding decision, and since the study seeks to measure perceptions after completion of the ZBB process, this timing was necessary for top management, in contrast to the necessity to survey lower management prior to the funding decision. The same attrition factors as for the first questionnaire produced 32 valid responses from a total of 39.

### *Measurement and identification of variables*

The questionnaires administered to lower management (i.e. levels four and five in the organization hierarchy) asked managers to indicate their current status in terms of MBO use or non-MBO use (independent variable). In addition, 28 questions were presented which generated the dependent variables listed in Exhibit 1. The first four questions dealt with major aspects of the goal setting process associated with ZBB implementation: specifically, the clarification of responsibility (variable  $X_1$ ); the improvement in understanding end results expected by top management (variable  $X_2$ ); the communication and coordination qualities between superiors and subordinates concerning responsibilities and expected end results (variable  $X_3$ ); and the value of the results obtained from the goal setting process in relation to the amount of work effort required. A Likert five point scale<sup>8</sup> was utilized to measure managerial perceptions on variables  $X_1$ – $X_4$ .

Questions 5–24 attempted to capture the essence of the resource allocation tasks associated with ZBB budget preparation from two different perspectives: a micro perspective intended to focus on the specific steps or functions of cross impact analysis, decision package formulation, and ranking, all of which are characteristic of ZBB; and a systemic (macro) perspective of these separate functions. It is well recognized in the accounting system and organization literatures that properties of a system's "parts" do not sum to properties of the "whole" system. The pilot test in the present organization confirmed this difference with respect to ZBB, and thus revealed the need to isolate the two perspectives. Hence, variables  $X_5$ – $X_{10}$ , variables  $X_{11}$ – $X_{16}$ , and variables  $X_{17}$ – $X_{21}$  were utilized to measure management perceptions on the micro aspects of cross-impact analysis, decision package formulation, and ranking, respectively, using the identical scale as for the goal-setting variables. Turning to the systemic perspective, questions 22–24 asked the managers to rate the ZBB

<sup>8</sup> The responses ranged from: 1 — to a very little extent; 2 — to a little extent; 3 — to some extent; 4 — to a great extent; and 5 — to a very great extent.



EXHIBIT 1. The dependent variables used in statistical tests relating to management perceptions of ZBB.

*Goal setting process (Hypothesis 1)*

- \*X<sub>1</sub> Clarifying responsibility of decision unit.
- \*X<sub>2</sub> Understanding end-results expected from decision unit.
- \*X<sub>3</sub> Facilitating superior/subordinate communication and agreement on responsibilities and expected end-results from decision unit.
- \*X<sub>4</sub> Effectiveness of goal setting process.

*Cross impact analysis (Hypothesis 2)*

- X<sub>5</sub> Involvement in cross impact analysis process.
- X<sub>6</sub> Facilitating agreement on interfacing decision unit support within department.
- X<sub>7</sub> Facilitating agreement on interfacing decision unit support with other departments.
- X<sub>8</sub> Development of cost awareness among users of service.
- X<sub>9</sub> Identifying redundant, duplicated, or unnecessary services.
- \*X<sub>10</sub> Effectiveness of cross impact analysis.

*Decision package formulation (Hypothesis 2)*

- X<sub>11</sub> Developing understanding of activities required to achieve decision unit objectives.
- \*X<sub>12</sub> Developing understanding of costs and benefits of performing incremental work.
- \*X<sub>13</sub> Developing understanding of relative priority of incremental work.
- X<sub>14</sub> Appropriate allocation of personnel.
- \*X<sub>15</sub> Communication capability for recommending courses of action.
- \*X<sub>16</sub> Effectiveness of decision package process.

*Ranking (Hypothesis 2)*

- X<sub>17</sub> Production of prioritized list of expenditure opportunities.
- X<sub>18</sub> Ensuring recognition of most beneficial packages by senior management.
- X<sub>19</sub> Understanding peer activities and related input.
- \*X<sub>20</sub> Understanding implications of alternative funding levels.
- \*X<sub>21</sub> Effectiveness of ranking process.

*Systems perspective of ZBB process (Hypothesis 2)*

- \*X<sub>22</sub> Preparing an effective departmental budget compared to previous methods.
- \*X<sub>23</sub> Improving communications among lower, middle, and upper management.
- \*X<sub>24</sub> Identifying and proposing improved ways of achieving decision unit objectives.

*Learning (Hypothesis 3)*

- X<sub>25</sub> Hours spent on planning and budgeting expenditures.
- X<sub>26</sub> Hours spent learning the process.
- X<sub>27</sub> Hours spent on documentation as opposed to conception of plans and budget.
- X<sub>28</sub> Estimated hours to complete entire process next year.

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\* Variables associated with upper management group.

process in three areas on a five point scale ranging from poor to excellent. Variable X<sub>22</sub> was utilized to measure the perceived effectiveness of ZBB compared to the traditional budgeting system which was used the previous year while variable X<sub>23</sub> was concerned with managers' perceptions on the ability of ZBB to improve communications between lower and upper management. Finally, variable X<sub>24</sub> attempted to measure management perceptions concerning the over-

all formulation of strategies necessary to achieve decision unit objectives.

Questions 25–28 were designed to operationalize the learning dimension associated with ZBB implementation. Variable X<sub>25</sub> measured the total time devoted to developing the operating budget using the ZBB system. Since any new systems implementation involves some strictly mental activity (i.e. conceiving new strategies) as opposed to formally docu-

menting these activities, variable  $X_{25}$  was decomposed into variable  $X_{26}$  and variable  $X_{27}$ , respectively. The last variable,  $X_{28}$ , measured managers' expectations on the amount of time ZBB would require in a subsequent budgeting cycle. This variable was deemed important in ascertaining if any consistency would ensue between variable  $X_{28}$  and variable  $X_{25}$ , or whether there were important shifts in time expectations between MBO users and non-MBO users. The measurements of variables  $X_{25}$  through  $X_{28}$  were all denominated in hours.

The questionnaire administered to upper management did not contain the identical set of questions administered to lower management, for reasons which were addressed earlier. However, ten questions which were presented to upper management contained the same content and enabled the generation of a *reduced set* of variables denoted by the asterisks in Exhibit 1. Again, a Likert five point scale was utilized to measure the perceptions of upper management on this reduced set of variables. Although Exhibit 1 indicates sixteen variables associated with upper management, there are, in substance, only ten. Variables  $X_1$  and  $X_3$  were differentiated for lower management but were grouped together as one question for upper management because the pilot study suggested that clarification of responsibilities and agreement on goals and objectives vis-a-vis the ZBB process could not be adequately differentiated among top managers. Also, variables  $X_4$ ,  $X_{10}$ ,  $X_{16}$  and  $X_{21}$ , were collapsed into a single overall question on ZBB effectiveness in the questionnaire to upper management because they were concerned with the global effectiveness of the ZBB system and not simply the effectiveness of any of its sub-parts.<sup>9</sup>

#### *Design and test procedures*

The objective in generating measured perceptions on the variable set for lower management is straightforward, given the hypotheses derived in the previous section. A test for the difference in perceived benefits between MBO users

(group 1) and non-MBO users (group 2) for the variables in Exhibit 1 was carried out using both univariate and multivariate analysis of variance (ANOVA). The differences between the two groups along these dimensions was then characterized using discriminant analysis. The advantage of the multivariate ANOVA and discriminant analysis is that the interaction effects among the variables is controlled for in the analysis.

The objective in generating measured perceptions on the reduced set of variables pertaining to upper management (group 3) was to draw some inferences on ZBB implementation for this group relative to lower management. Since the upper management sample was comprised of previous MBO-users only, it was impossible to generate two groups in the same manner as for lower management. This necessitated a comparative analysis of groups 1, 2 and 3 simultaneously on the reduced set of variables (asterisks) in Exhibit 1. A test for differences in perceived benefits among these three groups was conducted by the use of both univariate and multivariate ANOVA. A discriminant analysis was used to determine the relative importance of any of the dependent variables in the reduced set.

### RESULTS FOR LOWER MANAGEMENT

Table 1 presents the results of 28 separate ANOVA tests together with a multivariate analysis of variance (MANOVA) using a discriminant function technique.

#### *H<sub>1</sub>: Goal-setting*

While the corresponding *t*-values do not manifest any significant differences across the set of goal-oriented variables, the mean scores for three of the four goal-setting variables are *higher* for MBO users; only in terms of improving the understanding of end results expected from the decision unit (variable  $X_2$ ) did non-MBO users score higher. Thus, the general direction of the means is opposite to that

<sup>9</sup> Missing values on any variable were excluded from the data analysis. The degrees of freedom in subsequent statistical testing were adjusted accordingly.

TABLE 1. Results for lower management

Dependent variables	Means ( $\bar{X}$ )		d.f.	ANOVA		MANOVA Standardized canonical coefficients
	Group 1 MBO users	Group 2 Non-MBO users		t-value	p<	
<b>Goal setting</b>						
$X_1$	3.32	3.17	118	0.88	0.43	0.3616
$X_2$	3.17	3.31	118	-0.63	0.47	-0.4110
$X_3$	3.44	3.41	118	0.01	0.99	0.3037
$X_4$	2.92	2.83	116	0.35	0.66	0.5342
<b>Cross impact analysis</b>						
$X_5$	2.69	2.44	114	1.18	0.27	0.0160
$X_6$	2.71	2.51	104	1.11	0.34	0.4860
$X_7$	2.51	2.58	103	-0.29	0.74	-0.2658
$X_8$	2.79	2.81	105	0.01	0.93	0.1748
$X_9$	2.22	2.46	104	-0.89	0.24	-0.4552
$X_{10}$	2.68	2.64	106	0.30	0.86	0.3852
<b>Decision package formulation</b>						
$X_{11}$	3.19	3.37	118	-0.95	0.34	0.1130
$X_{12}$	3.12	3.27	118	-0.88	0.38	0.0423
$X_{13}$	3.02	3.37	117	-1.72	0.09	0.0496
$X_{14}$	2.98	3.27	117	-1.22	0.23	0.2701
$X_{15}$	3.03	3.49	117	-2.58	0.01	-0.4676
$X_{16}$	2.83	3.22	118	-2.07	0.04	-0.3124
<b>Ranking</b>						
$X_{17}$	3.20	3.46	116	-1.65	0.10	0.1109
$X_{18}$	2.88	3.31	117	-2.29	0.02	-0.2692
$X_{19}$	3.20	3.49	117	-1.48	0.14	-0.0899
$X_{20}$	3.18	3.31	117	-0.66	0.49	0.3259
$X_{21}$	2.86	3.27	116	-2.45	0.02	-0.2292
<b>Systems perspective of ZBB resource allocation process</b>						
$X_{22}$	3.14	3.51	116	-1.94	0.06	0.2782
$X_{23}$	3.22	3.66	117	-2.45	0.01	-0.3922
$X_{24}$	2.74	3.53	117	-4.49	0.00	-0.6833
<b>Learning</b>						
$X_{25}$	90.75	54.29	105	2.04	0.04	-0.7316
$X_{26}$	56.68	31.75	105	2.32	0.02	0.3475
$X_{27}$	34.07	22.54	105	1.93	0.06	0.6995
$X_{28}$	60.05	36.41	103	1.99	0.05	0.3479
<b>Discriminant function:</b>						$\chi^2 = 51.97$
Group centroids	0.808	-0.808				(0.0039)

hypothesized, and the ANOVA results do not indicate that MBO users obtained a less significant contribution from ZBB than non-MBO users. This does not imply, of course, that non-MBO users obtained a more significant contribution from ZBB. The implications of the latter are somewhat different, but will not be explored in this paper.

### *H<sub>2</sub>: Resource allocation process*

The mean scores of all three macro variables pertaining to the ZBB resource allocation process (variables  $X_{22}$ ,  $X_{23}$ ,  $X_{24}$ ) are significantly *lower* for MBO users relative to non-MBO users. At the micro level, thirteen out of a total of seventeen variables yielded *lower* mean scores for MBO users; six of the thirteen have corresponding *t*-values which are statistically significant. The remaining four variables ( $X_5$ ,  $X_6$ ,  $X_8$  and  $X_{10}$ ), all pertaining to the cross impact analysis function, indicate higher mean scores for MBO users but none of which are significant. Therefore, the evidence does not support the proposition in the professional literature that previous MBO use is associated with more positive benefits relative to non-MBO use due to the ZBB resource allocation process. Instead, the opposite relationship emerges for the ZBB resource allocation process, indicating that, perhaps, the sequencing mismatch discussed earlier is severe enough to cause previous MBO use to actually hinder the ZBB resource allocation process.

### *H<sub>3</sub>: Learning*

The mean scores for all four learning variables ( $X_{25}$ – $X_{28}$ ) are significantly *higher* for MBO users relative to non-MBO users. The negative *t*-values in each case are diametrically opposite to the research hypothesis. Thus, experience with an MBO system does not facilitate, in relative terms, the learning associated with ZBB implementa-

tion; it may even hinder it.

A multivariate analysis of variance (MANOVA) showed that the hypothesis of equal means for the two groups over the 28 variables should be rejected since  $p < 0.004$ . Given that there is a significant difference between the two groups on the set of 28 variables, a discriminant analysis provides a description of how the two groups differ. The standardized discriminant coefficients are arrayed in the last column of Table 1 and further elaborate on the ANOVA findings. The canonical discriminant functions evaluated at the group means for MBO users and non-MBO users are 0.808 and  $-0.808$ , respectively. The discriminant coefficients indicate that, for MBO users, the learning and goal-setting variables tend to be high relative to the resource allocation variables (particularly the macro variables) while the opposite relationship holds for non-MBO users. This tendency contradicts the relationship between both groups suggested by the research hypotheses and is significant at the 0.0039 level.

Given such strong evidence contrary to the research hypotheses, the ANOVA tests were replicated on a departmental basis. The objective was to search for possible differences within the corporation which may have biased the global findings. These results (not shown) yielded only seven directional changes out of a possible 168 departmental mean scores. As expected, the exceptions (none significant) were confined to the goal-setting and cross impact analysis variables. Therefore, departmental characteristics did not appear to be a factor influencing the global results.<sup>10</sup>

There is a possibility of a different bias in the above results contingent on the *nature* of the departmental tasks. Hofstede (1981) suggests that objectives, outputs, intervention effects, and the repetitiveness of activity, are factors

<sup>10</sup> There may be concern among some readers that the ordinal data generated by the Likert-type scale contravenes the assumption of normality associated with the parametric ANOVA and MANOVA statistical tests employed in this study, and hence, necessitates the use of analogous non-parametric statistical tests. Accordingly, a non-parametric Kruskal–Wallis one-way ANOVA test was conducted for each of the 28 variables listed in Table 1 and the levels of significance were found to be virtually identical to those produced by the parametric tests. Also, a multivariate Kruskal–Wallis (Katz & McSweeney, 1980) was performed on the set of 28 variables and, again, the level of significance was basically the same as that of the parametric MANOVA test.

which differentiate the substantive nature of operating departments from administrative and service-oriented departments. ZBB is purportedly more adaptive to the latter type of department. In order to gain additional insight into this matter and to provide additional evidence for the above results, departments were partitioned into two classifications: operating and service. Given the mean scores on each ZBB variable for both MBO users (Group 1) and non-MBO users (Group 2), the discriminant analysis technique yields a predictive measure of the group membership for each respondent. Since each questionnaire, in turn, was also coded by type of department, it was possible to ascertain if significant differences in group membership were being generated in the above dichotomous departmental classification.

Table 2 presents the results of the discriminant analysis utilizing the mean scores on the set of ZBB variables to predict departmental MBO

user and non-MBO user membership. The accuracy is remarkably high and statistically significant for all departments considered collectively, and for operating and service departments considered separately. The difference in accuracy between operating and service departments is less than 4%; thus, the nature of departmental tasks does not appear to confound the earlier results.

#### RESULTS FOR TOTAL MANAGEMENT HIERARCHY

The complexity and orientation of upper management decision making in the ZBB implementation process precluded any measurement of the learning variables for that group; thus, research hypothesis  $H_3$  is irrelevant to the following analysis. Also, the necessity for upper management to be familiar with MBO prohibited

TABLE 2. ZBB perceptions as indicators of group status\*

		Predicted group			
		Group 1		Group 2	
Actual group	MBO users (Group 1)	51	31	11	7
			20		4
	Non-MBO users (Group 2)	12	8	47	27
			4		20

\* Each cell is trichotomized to reflect the total sample, operating departments (upper right), and service departments (lower right).

Percent correctly classified: All departments 80.99% ( $p < 0.001$ ).  
 Operating departments 79.45% ( $p < 0.001$ ).  
 Service departments 83.33% ( $p < 0.001$ ).

the construction of two independent status groups as was done for lower management. The testing strategy employed, therefore, attempted to discriminate upper management perceptions from the previous two lower management status groups on a reduced, but substantively identical, set of dependent ZBB variables pertaining to the goal-setting and resource allocation processes. Accordingly, the following null hypotheses were tested:

$H_4$ : The goal-setting process associated with ZBB implementation yields no difference in the level of perceived benefits among MBO users from lower management (group 1), non-MBO users from lower management (group 2), and upper management (group 3).

$H_5$ : The resource allocation process associated with ZBB implementation yields no difference in the level of perceived benefits among MBO users from lower management (group 1), non-MBO users from lower management (group 2), and upper management (group 3).

Table 3 presents the ANOVA and MANOVA results. Although the mean scores differ slightly among the three groups for the goal-setting variables, the ANOVA differences are not statistically significant. This finding reinforces the earlier results which indicated that previous MBO exposure did not lessen ZBB's perceived contribution to the goal-setting process (and, similarly, that non-exposure did not increase ZBB's contribution). We are therefore unable to reject hypothesis  $H_4$ . The situation is different, however, for the resource allocation process variables. All four<sup>11</sup> macro variables (i.e.  $X_{22}$ ,  $X_{23}$ ,  $X_{24}$ , and  $Y_2$ ) plus two of the four micro variables (i.e.  $X_{13}$  and  $X_{15}$ ) are significantly different among the three groups in the ANOVA analysis. There is thus strong evidence for rejection of hypothesis  $H_5$ . The two significant discriminant functions ( $p < 0.000$  and  $p < 0.031$ ) confirm that the mean scores are not equal among the three groups over the entire set of ten variables.<sup>12</sup> The critical issue which emerges is how the means of the groups differ over this reduced set of variables

when all variables are considered simultaneously.

A closer examination of the individual group means for the goal-setting variables indicates that perceptions of top management are very close to those of group 1 for variable  $X_2$ , but are lower than the perceptions of either group 1 or group 2 for variable  $Y_1$ . However, the acceptance of research hypothesis  $H_1$  in terms of top management would require that the group 3 means be *significantly* lower than the group 2 means for *both* the goal-setting variables  $X_2$  and  $Y_1$  and this is certainly not the case. Focusing attention on the resource allocation process variables reveals a split in the tendency for top management perceptions to be more or less similar to the perceptions of groups 1 and 2. Specifically, the means for groups 2 and 3 tend to be similar (and higher) on variables  $X_{12}$ ,  $X_{13}$ ,  $X_{23}$  and  $X_{24}$ , while the means for groups 1 and 3 tend to be similar (and lower) on the remaining variables. In no instance, however, are the means for group 3 significantly higher than the means for group 2 on any of the resource allocation process variables and they clearly tend to be lower. Thus, the arguments from the professional literature are not supported for upper management on either the goal setting or resource allocation aspects of ZBB.

The above interpretation is formulated on the univariate ANOVA results and does not consider the interaction effects among the ten ZBB variables. Again though, a discriminant analysis can provide a description of how the three groups differ inclusive of interaction effects. In order to permit additional insight into this question, a plot of the standardized coefficient centroids in reduced space formed by the two discriminant functions is shown in Table 4 along with the more relevant discriminant coefficients from Table 3. The standardized coefficients of effectiveness ( $Y_2$ ) and understanding expected end-results of the goal-setting process ( $X_2$ ) are negative, while the systemic variable of achieving

<sup>11</sup> Because it was necessary to average the effectiveness variables  $X_4$ ,  $X_{10}$ ,  $X_{16}$ , and  $X_{21}$  for groups 1 and 2 for reasons of comparability with group 3,  $Y_2$  is treated as a macro variable in the analysis of the total management hierarchy.

<sup>12</sup> The univariate and multivariate non-parametric Kruskal-Wallis tests were repeated for the ten variables listed in Table 3 and yielded essentially the same significance levels as those of the parametric tests.

TABLE 3. Results for total management hierarchy

Dependent variables	Means ( $\bar{X}$ )			ANOVA		MANOVA	
	Group 1 MBO users	Group 2 Non-MBO users	Group 3 upper management	F-value	p<	Standardized canonical coefficients Function 1	Function 2
<b>Goal setting</b>							
*Y <sub>1</sub>	3.35	3.28	3.16	0.2269	0.80	0.0929	0.1755
X <sub>2</sub>	3.17	3.31	3.16	0.4025	0.67	-0.4519	-0.5658
<b>Decision package formulation</b>							
X <sub>12</sub>	3.12	3.27	3.28	0.7954	0.45	0.2908	-0.4870
X <sub>13</sub>	3.02	3.37	3.41	2.207	0.11	0.3252	-0.1737
X <sub>15</sub>	3.03	3.49	3.13	4.078	0.02	0.1734	0.3770
<b>Ranking</b>							
X <sub>20</sub>	3.18	3.31	3.06	0.8234	0.44	-0.0818	-0.1142
<b>Systems perspective of ZBB process</b>							
X <sub>22</sub>	3.14	3.51	3.03	3.536	0.03	-0.2193	0.3772
X <sub>23</sub>	3.22	3.66	3.50	3.477	0.03	0.3256	-0.0564
X <sub>24</sub>	2.74	3.53	3.38	10.23	0.00	0.8064	0.3999
†Y <sub>2</sub>	2.72	2.90	2.16	7.519	0.00	-0.9373	0.6718
<b>Discriminant function</b>						$\chi^2 = 61.140$ (0.0000)	$\chi^2 = 18.388$ (0.0309)

\* Y<sub>1</sub> represents the average of variables X<sub>1</sub> and X<sub>3</sub> for Groups 1 and 2.

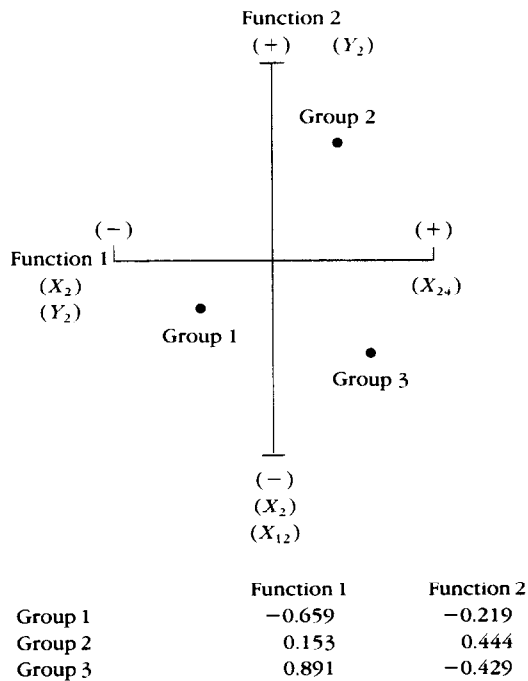
† Y<sub>2</sub> represents the average of variables X<sub>4</sub>, X<sub>10</sub>, X<sub>16</sub> and X<sub>21</sub> for Groups 1 and 2.

objectives (X<sub>24</sub>) is positive for discriminant function 1. Interestingly, discriminant function 2 indicates a positive standardized coefficient for effectiveness (Y<sub>2</sub>) while that of understanding expected end-results of the goal-setting process (X<sub>2</sub>) remains negative. The other relevant standardized coefficient from discriminant function 2 of understanding the net benefits from incremental analysis (X<sub>12</sub>) is also negative.

An interesting pattern emerges from the two discriminant functions plotted in Table 4. Function 1, which captures 71.78% of the variance, indicates that group 1 tends to score relatively

higher on the goal-setting variable X<sub>2</sub> and the resource allocation variable Y<sub>2</sub>, but relatively lower on the resource allocation variable X<sub>24</sub> in comparison to group 2 which has the opposite tendency. However, because the centroid of group 3 falls in the lower right-hand quadrant, there is a tendency for group 3 to behave similar to group 2 on these variables. On the other hand, function 2, which captures 28.28% of the variance, indicates that group 2 tends to score relatively higher on the resource allocation process variable Y<sub>2</sub> and relatively lower on the goal-setting variable X<sub>2</sub> and the resource allocation vari-

TABLE 4. Plot of standardized coefficient centroids



able  $X_{12}$  in comparison to both groups 1 and 3. It should be specifically noted that, although all three groups are equally discriminated by the discriminant function analysis (since an approximately equilateral triangle was generated in the discriminant space), the variances accounted for by each function (significant by their corresponding eigenvalues) were considerably different: function 1 accounts for approximately 2.5 times more variance than function 2 in the actual subjects  $\times$  group variation. The clear positive loadings on function 2 for group 2 and the negative loadings on both functions 1 and 2 for group 1, in conjunction with the above discussion of Table 4, thus indicates that group 3 is not uniquely different from the other two groups. Considering these results together with the consistently higher mean scores for group 2 over all variables compared to the other groups (see Table 3) serves to strengthen the conclusion that research hypotheses  $H_1$  and  $H_2$  cannot be accepted with respect to the upper management group.

There may be concern, however, that the

smaller number of observations for group 3 reduced the power of the multivariate test. Table 5 suggests that this is not the case. The predictive accuracy for group 3 ranked highest (71.9%), group 2 ranked next (57.6%), and group 1 ranked lowest (52.6%). The total sample correctly classified is 58.78% with  $p < 0.001$ .

## DISCUSSION AND IMPLICATIONS

The evidence uncovered in this study raises several questions about the design process of budgeting systems and the credibility of implementing ZBB with an existing MBO system. On the one hand, it would appear that design strategies which concentrate only on the system to be implemented fail to recognize important anchoring conditions and stabilized learning behaviors (Hedberg & Jonsson, 1978; Staw *et al.*, 1981) which thwart integration efforts and the subsequent validity of the new information systems. While the results obtained here do not contradict generalized strategies normally employed with ZBB implementation, neither do they suggest that such strategies, taken alone, are sufficient. Even more important though, is that the results underscore the need to pursue Hopwood's (1978) and Boland's (1979) call for increased research toward understanding the systemic properties and qualities of different budgeting and management information systems.

Perhaps the most intriguing finding in the present study is the magnitude and directional differences discovered in comparison to the research hypotheses. Not only could the latter not be accepted, but both the univariate and multivariate analysis manifested significant differences in the opposite direction for a number of variables. Thus the prescriptions in the professional literature, which anticipate that ZBB implementation will be facilitated by the prior existence of MBO, not only appear to be misguided, but in fact, apparently overlook significant factors which tend to inhibit such implementation. While we have previously noted some



TABLE 5. ZBB perceptions as indications of group status

		Group 1	Predicted group Group 2	Group 3	
Actual group	MBO users (Group 1)	30 (52.6%)	17 (29.8%)	10 (17.5%)	57*
	Non-MBO users (Group 2)	13 (22.0%)	34 (57.6%)	12 (20.3%)	59*
	Upper manage- ment (Group 3)	3 (9.4%)	6 (18.8%)	23 (71.9%)	32

Combined percent correctly classified: 58.78% ( $p < 0.001$ ).

\* Five cases could not be discriminated from lower management sample.

potential counter-arguments to those in the professional literature, they do not appear to explain sufficiently the findings over the total management hierarchy for the goal-setting and resource allocation variables considered in concert. More appropriate in this context is an interpretation reflective of symbolic or ritualistic behavior (Dirsmith & Jablonksy, 1979b; Dirsmith *et al.*, 1980; Jonsson, 1982). It is conceivable that top management, although committed in principle to the voluntary MBO program, was genuinely disappointed with its inability to cope with dramatically increasing costs. ZBB implementation was seen as an incremental action program consistent with existing organizational myths and values, and therefore, as preserving a sense of organizational stability. Upper management thus built upon the MBO goal structures and simply shifted their MBO experience to the ZBB resource allocation process.

Effective control over discretionary spending in a ZBB system though, is constrained by uncertain cause/effect relationships and ambiguous output standards (Williams, 1981). It is likely in the present case that the MBO goal structures could not be nicely decomposed so as to match the decentralized strategy formulation process which *precedes* the formation of operational goals in the ZBB process. Attempts to enhance

control under these conditions are supported by ritual and not by rational analysis (Ouchi, 1977). This may explain why upper management perceived more benefit from the goal-setting process than predicted by research hypothesis  $H_1$  and simultaneously yielded responses aligned more closely to lower level MBO users on resource variables  $X_{15}$ ,  $X_{20}$  and  $X_{22}$ , as evidenced in Tables 3 and 4. Thus, MBO experience was a poor teacher and could not crystallize otherwise ambiguous links between uncertain cause/effect knowledge and desired outcomes. This explanation is reinforced by upper management's low perceived benefit of the over-all effectiveness (variable  $Y_2$ ) of ZBB implementation.

A commitment to demonstrating rationality, even if symbolic, does not fully explain the above results nor the importance of function 2 in Tables 3 and 4. That is, why are the resource allocation variables  $X_{12}$ ,  $X_{13}$ ,  $X_{23}$  and  $X_{24}$  aligned between upper management and lower level *non-MBO users*? Furthermore, why did each of these two groups indicate higher perceived benefits than lower level MBO users on this subset of variables? Each of these co-alignment patterns may be sensible in the context of viewing MBO as a stabilizing system and ZBB as a destabilizing system (Williams, 1981). Smooth integration of ZBB with MBO might not even be

anticipated, since managers familiar with a stabilizing system may be confused or threatened by efforts to implement a destabilizing system. In this case, it could be argued that MBO was an important part of the organization's power structure, since it enabled lower level managers to have a voice in determining their objectives and spending programs. MBO was thus a stabilizing element. ZBB implementation, on the other hand, provided the organization with a legitimate system for concentrating influence and control at higher levels in the hierarchy. Although it constricted control, ZBB implementation was destabilizing because it called into question the status quo arrangements of MBO. This implementation action would have been seen as threatening to lower level MBO users who had become accustomed to the autonomy which MBO conferred.

Systems designers, therefore, must be cognizant of the potential mismatch of system characteristics when dual systems are placed in joint use. Expectations of systems compatibility predicted by conventional rationality may be unfounded when viewed from a stabilizing/destabilizing perspective (Williams, 1983). The results in this study, for upper management in particular, indicate that this factor may have been operative. Also, a focus on a stabilizing/destabilizing theme by accounting researchers could enhance our systems understanding of maladaptive or pathological cycles of behavior (Merton, 1967; Hall, 1976) and corresponding threat-rigidity effects (Staw *et al.*, 1981) on important implementation issues. More research in the area certainly appears to be warranted.

The practical significance of this study must be approached with some caution. Potentially serious errors in judgment could arise if upper management is unable to correctly rationalize the mismatch between *a priori* implementation expectations and *de facto* implementation experience. The ZBB process might be abandoned completely, or severely limited in scope during subsequent budgeting cycles, precisely when organizational effectiveness and/or survival demand more ZBB and less MBO. In fact, it

may well be prudent to have MBO dismantled entirely before ZBB is introduced to the organization. This prescription is in addition to general "last-day-of-use" ideas (Hedberg *et al.*, 1976), which could apply to both MBO and ZBB, and is specific to the situation where ZBB is needed and MBO already exists. These are matters which additional research on the coupling of ZBB with MBO must address.

## LIMITATIONS

The extent to which the results of this study can be generalized to ZBB integration with MBO in other private sector organizations is, of course, limited by the usual caveats that apply to a field study involving only a single organization. Although management demographic data and departmental context did not present any obvious bias, several aspects of the study were potentially troublesome.

The selection of variables yielded a rather lengthy list which suggests that the questionnaire could be simplified. However, ZBB is a very complex budgeting process (Hofstede, 1981) and there was no simple mechanism for isolating key variables. In particular, the decision was made to include the set of micro resource allocation variables since each one of them is accorded importance in the standard technology underlying a complete ZBB implementation, and hence, they may have provided a more profound insight than consideration of only the macro or systemic aspect of the ZBB resource allocation process. Also, the large set of dependent variables raises questions of understandability and possible ambiguity which could have confounded management perceptions and their responses. Each variable was, however, deliberated upon in the ZBB training sessions which were attended by all participants in the ZBB implementation process. Moreover, all participants were engaged in the same training program and standardized procedures and formats were common across departments.

This leads to a second issue of concern, namely, the utilization of two asymmetrical (at

least in form) questionnaires. Several factors were instrumental in this decision. First, the nature and complexity of ZBB implementation is systematically different for various hierarchical levels in an organization generally; functional tasks are not uniform, management orientation and commitment to the organization may be different, and management responsibilities are not homogeneous, as one traverses from lower to higher echelons. This is most evident in the funding decision, which emanates from top management and not lower levels in the hierarchy. Thus, it was imperative to try to capture this aspect together with the differential in management functions. The omission of the learning variables from the upper management questionnaire also reflects these differences. For example, preliminary research, pilot testing ZBB, and the design of communication documents were confined to the efforts of upper management and the time involvement could not be objectively differentiated as it was for lower management.

In an effort to minimize any bias in respondent's perceptions, strict control was applied to the timing and exposure of each set of questionnaires. Lower level managers were not aware of the funding decision, while simultaneously, upper management was not cognizant of the responses pertaining to the former group.

A third issue relates, not to the MBO program *per se*, but to its voluntary nature. The program clearly permitted free choice among managers, and thus, management resistance (Nystrom, 1977) is not an issue either way. Since the ZBB program was mandated across all management levels regardless of MBO user status, it is difficult to accept that the *voluntary* nature of the MBO program, in itself, created any attitudinal bias in the data base.

Finally, only a single post-test design was employed, again, due to the uniqueness of the ZBB implementation process. Certainly over time, learning, unlearning, and relearning

behaviors become dominant dynamic factors which impact the longer term effectiveness of coupling ZBB with MBO. Then, too, the *ex ante* aspects of ZBB become enmeshed with the *ex post* control aspects together with everything which this implies from a research design perspective. These issues are not the focal point of the present study but they do provide rich opportunities for future inquiry.

## CONCLUSIONS

The findings of this study are in disharmony with prescriptions in the professional literature which view an established MBO system as a precondition to the smooth and easy implementation of ZBB. These prescriptions attend to the conjunction of an existing MBO system, with the normal ZBB implementation steps, as a process of stabilizing change, grounded in the rational behavior of ordinary adaptation. Ignored in this conventional wisdom is the possibility that the complementarity of ZBB and MBO is a double-edged mechanism. Elements of symbolic rationality, ritualistic control, and the restructuring of information flows with requisite authority, create unanticipated destabilizing effects. Moreover, as the evidence in this study demonstrates, these effects may not be isomorphic across different hierarchical levels in the organization.

In short, organization and individual goals can change in the course of introducing deliberate innovations (such as the coupling of ZBB with MBO) and "As a result, actions affect the preferences in the name of which they are taken . . ." (March, 1981, p.570). Finally, the results suggest that future research on the linkages of ZBB with MBO (and systems implementation compatibility in general) should focus on the anomalous dynamics of the existing system and the new coupled system.

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